

## CLAIMS:

1. Charge pump device containing at least two stages (S), whereby a stage (S) comprises a switch ( $SW_n$ ) and a charge device ( $CS_n$ ) which are arranged to generate a voltage higher than the supply voltage ( $V_{dd}$ ), whereby the stages (S) are arranged in serie and a required multiplication factor (MF) of the charge pump (CP) is adjustable by activating/deactivating a definable number of stages (S), whereby the switches ( $SW_n$ ) of each stage ( $S_n$ ) are arranged in the same way.

2. Charge pump device as claimed in claim 1, whereby for a multiplication factor (MF) smaller than the maximal possible multiplication factor ( $MF_{max}$ ) the stages (S) beginning from an input (IN) of the charge pump (CP) device will be deactivated.

3. Charge pump device as claimed in claim 1, whereby a switch ( $SW_1$ ) comprises a switch MP1 which is arranged between an input (IN) and an output (OUT) of the stage (S) of the charge pump device

further two transistors MP2 and MP3 for controlling the isolated bulk of the switch ( $SW_1$ ) and

a fourth transistor MP4 to charge a boot capacitor ( $C_B$ ), whereby the boot capacitor ( $C_B$ ) is arranged for storing the charge to drive the gate of the switch (MP1)

further comprises a gate switch control unit (GSU), whereby the gate switch control unit (GSU) is arranged to control the gate of the switch MP1.

4. Charge pump device as claimed in claim 3, whereas the switch MP1 is preferably realized as isolated bulk transistor.

5. Charge pump device as claimed in claim 3, containing a level generation unit (LGU) for providing control signals for the gate switch control unit (GSU).

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6. Charge pump device as claimed in claim 3, whereby the gate switch control unit (GSU) is foreseen to connect or disconnect the gate of the switch MP1 transistor from the  $C_B$  capacitor.

5 7. Charge pump device as claimed in claim 3, whereby the gate switch control unit (GSU) is arranged to provide control signals to the switch (SW) of the stage (S) in case of voltages below  $V_{dd}$ .

10 8. Display driver (DD) for providing display information and voltages to a display unit (DU) with a charge pump (CP) device containing at least two stages (S), whereby a stage comprises a switch ( $SW_N$ ) and a charge device ( $CS_n$ ) which are arranged to generate a voltage higher than the supply voltage ( $V_{dd}$ ), whereby the stages (S) are arranged in serie and all stages (S) are realized in the same way and a required multiplication factor is adjustable by activating/deactivating a certain number of stages (S).

15 9. Display module (DM) having a display unit (DU) and a display driver (DD) with a charge pump (CP) device, containing at least two stages (S), whereby a stage comprises a switch ( $SW_n$ ) and a charge device ( $CS_n$ ) which are arranged to generate a voltage higher than the supply voltage ( $V_{dd}$ ), whereby the stages (S) are arranged in serie and all  
20 stages (S) are realized in the same way and a required multiplication factor (MF) is adjustable by activating/deactivating a certain number of stages (S).

10. Telecom terminal having a display module (DM), a display unit (DU) and a display driver (DD) with a charge pump (CP) device, containing at least two stages (S),  
25 whereby a stage comprises a switch ( $SW_n$ ) and a charge device ( $CS_n$ ) which are arranged to generate a voltage higher than the supply voltage ( $V_{dd}$ ), whereby the stages (S) are arranged in serie and all stages (S) are realized in the same way and a required multiplication factor (MF) is adjustable by activating/deactivating a certain number of stages (S).